

AMENDMENTS TO THE CLAIMS

The following listing of claims will replace all prior versions and listings of claims in the application.

1. (currently amended) A method of managing resources of a service-oriented information system having a service-oriented architecture (SOA), the method comprising:

- providing information services, quality of service (QoS) management services, and resource management services to a plurality of client applications;
- receiving a quality of service (QoS) message from a client application expressing at least one QoS requirement as at least one parameter value;
- notifying the client that the at least one QoS requirement is denied;
- receiving a revised QoS message from the client and negotiating a contract with the client for quality of service based on the revised message;
- allocating at least one resource of the system to the client based on the negotiated contract; and

- when the client is using the at least one allocated resource:
 - monitoring QoS parameters with regard to the negotiated contract to determine whether the client is using the at least one allocated resource in accordance with the negotiated contract, and changing the allocation specifically as to the client application of the at least one allocated resource in response to usage of the at least one allocated resource by the client application determined to be not in accordance with the negotiated contract;

the providing, receiving, notifying, allocating, monitoring, and changing performed by an information broker of the system, the information broker executed by a processor configured with memory included in the system.

2. (original) The method of claim 1, wherein the client expresses the at least one QoS requirement in a plurality of categories of QoS characteristics.

3. (previously presented) The method of claim 1, further comprising, through the broker, governing interaction of the client with the system based on the contract.

4. (original) The method of claim 1, further comprising: receiving a plurality of QoS messages from a plurality of the clients; and allocating resources of the system based on a resource allocation policy.

5. (previously presented) The method of claim 1, wherein allocating at least one resource comprises using a common management interface to implement a self-configuration of at least one self-configurable resource.

6. (previously presented) The method of claim 5, wherein implementing a self-configuration of at least one self-configurable resource comprises implementing a resource as an object of a subclass of an abstract resource class.

7. (original) The method of claim 1, further comprising using the at least one parameter value to set at least one QoS value for the at least one resource.

8. (canceled)

9. (original) The method of claim 1, wherein establishing a contract comprises allowing the client to revise the parameter values to become consistent with a resource allocation policy of the system.

10. (currently amended) The method of claim 1, wherein the information system includes a service-oriented architecture (SOA), said method performed as a service invoked by the client.

11. (original) The method of claim 1, further comprising:
receiving a plurality of QoS messages from a plurality of clients preparing to publish or subscribe a message or request a task execution; and
establishing contracts with the clients for quality of service based on their requirements expressed in the QoS messages.

12. (currently amended) A management apparatus for managing quality of service (QoS) in an information system having a service-oriented architecture, the management apparatus comprising:
a processor and memory; and
an information broker encoded in the memory and executable by the processor to provide information services, quality of service (QoS) management services, and resource management services to a plurality of client applications;
the broker executable by the processor to:
receive a quality of service (QoS) message from a client application expressing at least one QoS requirement as at least one parameter value;
notify the client that the at least one QoS requirement is denied;
receive a revised QoS message from the client and negotiate a contract with the client for quality of service based on the revised QoS message;
allocate at least one resource of the system to the client based on the negotiated contract;
while the client is using a resource allocated to the client as a result of the contract, manage the allocated resource in accordance with the contract and monitor the allocated resource to determine whether the client is using the allocated resource in accordance with the contract; and
change a QoS attribute of the resource allocated to the client, the change specific to the client and based on a determination by the broker that a QoS parameter for the allocated resource has varied from a value established in the contract.

13. (previously presented) The management apparatus of claim 12, the broker further executable by the processor to express and query a plurality of levels of QoS policies defined for network systems.

14. (currently amended) The management apparatus of claim 12, the broker further executable by the processor to allocate the at least one resource of the information system to a client based on at least one of a policy and the at least one contract.

15. (canceled)

16. (previously presented) The management apparatus of claim 12, the broker further executable by the processor to manage the at least one resource using a common management interface.

17. (previously presented) The management apparatus of claim 12, wherein the managing is decoupled from a platform for which the at least one resource is implemented.

18. (currently amended) The management apparatus of claim 12, wherein the information system comprises a service-oriented architecture (SOA), the management apparatus further configured as one of a plurality of services of the information system.

19. (currently amended) A quality of service (QoS) management service for use in an enterprise system having a service oriented architecture (SOA), the QoS management service comprising a processor and memory of the enterprise system and a broker for a plurality of component services, the broker configured in the memory and executable by the processor to:

receive a QoS message from a service requester of the enterprise system expressing at least one QoS parameter;

notify the service requester that the at least one QoS parameter is unacceptable;

create a contract with the service requester for quality of service based on a revised QoS message received from the service requester;

allocate at least one resource of the system to the service requester based on the created contract;

when the contract has resulted in a resource having been allocated to the service requester and when the service requester is using the allocated resource, monitor the QoS parameters in the contract pertaining to the allocated resource to determine whether the contract is being adhered to by the service requester; and

adapt allocation of the resource to enforce the contract of the service requester when the service requester is using the at least one resource, the changing performed specifically as to the service requester and based on the determining.

20. (original) The QoS management service of claim 19, wherein the component services are further configured to adapt at least one resource of the enterprise system based on the monitoring.

21. (previously presented) The QoS management service of claim 19, wherein the component services are made available to the service requester by the processor through the broker.

22. (original) The QoS management service of claim 19, wherein the component services are configured to manage a plurality of resources of the enterprise system based on a plurality of QoS contracts with a plurality of service requesters.

23. (original) The QoS management service of claim 22, wherein the plurality of service requesters comprise tasks and messages.

24. (original) The QoS management service of claim 19, wherein the component services are configured in a middleware layer of the enterprise system.

25. (currently amended) A ~~tangible non-transitory~~ machine-readable medium for use with a processor having a memory, the machine-readable medium comprising:

instructions executable by the processor to provide a broker service commonly available to a plurality of client applications for quality of service (QoS) management in an information system having a service-oriented architecture (SOA);

instructions executable by the processor to receive, through the broker, a quality of service (QoS) message from a client application of the information system expressing at least one QoS requirement as at least one parameter value;

instructions executable by the processor to negotiate, through the broker, a contract with the client for quality of service based on the at least one parameter value,

instructions executable by the processor to allocate, through the broker, at least one resource of the information system to the client based on the contract; and

instructions executable by the processor to, through the broker, create and directly manage the new resource at a middleware layer of the information system, wherein to directly manage the resource comprises to change a QoS attribute of the resource specifically as to the client and based on a determination by the broker that a QoS parameter for the allocated resource has varied from a value established in the contract.

26. (currently amended) An apparatus comprising:

a computer-readable memory device having code embodied thereon to provide an information broker for an information system having a service-oriented architecture (SOA), the broker configured to, when executed by a processor of the information system, provide information services, quality of service (QoS) management services, and resource management services to a plurality of client applications;

the broker further configured to receive a quality of service (QoS) message from a given client application and negotiate, via a QoS management service exported by the broker to the given client application, a contract with the given client application for a given quality of service based on at least one parameter value in the QoS message;

the broker further configured to create at least one new resource of the information system based on the contract, to monitor use of the created resource with regard to the contract and the given quality of service after the created resource has been allocated under the contract to the given client application and as the created resource is being used by the given client application, and to at least temporarily adapt use of the created resource by the given client application, while the resource is being used, to restore operation of the given client application under the contract to the given quality of service.

27. (canceled)

28. (currently amended) A QoS management service for use in an enterprise system having a service oriented architecture (SOA), the QoS management service comprising: a processor of the enterprise system, the processor having memory configured with code executable by the processor to provide a broker through which information services, quality of service (QoS) management services, and resource management services are provided to a plurality of client applications; the broker configured to provide:

a QoS manager configured to receive a QoS message from a client application of the system expressing at least one QoS parameter;

an establishment service configured to establish with the client a QoS contract that includes the at least one parameter as revised from a previous QoS message from the client application; and

a resource manager configured to reconfigure and allocate to the client at least one resource of the system based on the established contract;

the broker further configured to enforce the established contract by adapting the allocation specifically as to the client during a period in which the client uses the at least one resource outside the established contract.

29. (original) The QoS management service of claim 28, further comprising a policy manager configured to:

- check at least one policy of the system with regard to the at least one QoS parameter; and
- determine at least one resource for satisfying a requirement of the client expressed in the at least one QoS parameter.

30. (original) The QoS management service of claim 28, further comprising an operation service configured to commit and initialize the at least one resource.

31. (original) The QoS management service of claim 28, further comprising a prediction service configured to:

- track system conditions in terms of the at least one QoS parameter; and
- predict a future system condition based on the tracked conditions.

32. (original) The QoS management service of claim 28, further comprising an adaptation service configured to change a resource based on the at least one QoS parameter.

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